

FORM PTO-1390 (REV. 5-93)	U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER 2345/112
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 09/462017
INTERNATIONAL APPLICATION NO. PCT/EP98/03747	INTERNATIONAL FILING DATE (19.06.98) 19 June 1998	PRIORITY DATE CLAIMED: (01.07.97) 01 July 1997
TITLE OF INVENTION PROCESS AND SYSTEM FOR CONTROLLING THE USE OF SATELLITE TRANSMISSION CAPACITY IN TERRESTRIAL NETWORKS		
APPLICANT(S) FOR DO/EO/US HENKEL, Hans-Jürgen		
<p>Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information</p> <p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).</p> <p>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <ol style="list-style-type: none"> <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). <input checked="" type="checkbox"/> has been transmitted by the International Bureau. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) <p>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <ol style="list-style-type: none"> <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). <input type="checkbox"/> have been transmitted by the International Bureau. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. <input checked="" type="checkbox"/> have not been made and will not be made. <p>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). (Unsigned)</p> <p>10. <input checked="" type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11. to 16. below concern other document(s) or information included:</p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.</p> <p><input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>14. <input type="checkbox"/> A substitute specification.</p> <p>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>16. <input checked="" type="checkbox"/> Other items or information: Preliminary Examination Report and International Search Report.</p>		

U.S. APPLICATION NO. if known see
37 C.F.R.1.5 09/462017INTERNATIONAL APPLICATION NO.
PCT/EP98/03747

428 Rec'd PCT/PTO 30 DEC 1999

ATTORNEY'S DOCKET NUMBER
2345/112

17. The following fees are submitted:

Basic National Fee (37 CFR 1.492(a)(1)-(5)):

Search Report has been prepared by the EPO or JPO \$840.00

International preliminary examination fee paid to USPTO (37 CFR 1.482) \$670.00

No international preliminary examination fee paid to USPTO (37 CFR 1.482) but
international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$760.00Neither international preliminary examination fee (37 CFR 1.482) nor international
search fee (37 CFR 1.445(a)(2)) paid to USPTO \$970.00International preliminary examination fee paid to USPTO (37 CFR 1.482) and all
claims satisfied provisions of PCT Article 33(2)-(4) \$96.00CALCULATIONS | PTO USE ONLY**ENTER APPROPRIATE BASIC FEE AMOUNT =**

\$ 840

Surcharge of \$130.00 for furnishing the oath or declaration later than 20 30 months
from the earliest claimed priority date (37 CFR 1.492(e)).

\$

Claims	Number Filed	Number Extra	Rate	
Total Claims	14 - 20 =	0	X \$18.00	\$ 0
Independent Claims	2 - 3 =	0	X \$78.00	\$ 0
Multiple dependent claim(s) (if applicable)			+ \$260.00	\$ 0

TOTAL OF ABOVE CALCULATIONS =

\$ 840

Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must
also be filed. (Note 37 CFR 1.9, 1.27, 1.28).

\$

SUBTOTAL =

\$ 840

Processing fee of \$130.00 for furnishing the English translation later the <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).	+	\$
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TOTAL NATIONAL FEE =

\$ 840

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property	+	\$
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TOTAL FEES ENCLOSED =

\$ 840

Amount to be: refunded	\$
charged	\$

a. A check in the amount of \$ _____ to cover the above fees is enclosed.

b. Please charge my Deposit Account No. 11-0600 in the amount of \$ 840.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

c. The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 11-0600. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status. *By: Richard L. Mayer, Reg. No. 22,490*

Richard L. Mayer
SIGNATURE

SEND ALL CORRESPONDENCE TO:

Kenyon & Kenyon
One Broadway
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NAME

12/30/99

DATE

09/462017

428 Rec'd PCT/PTO 30 DEC 1999

[2345/112]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Hans-Jürgen HENKEL
Serial No. : To Be Assigned
Filed : Herewith
For : PROCESS AND SYSTEM FOR CONTROLLING THE
USE OF SATELLITE TRANSMISSION CAPACITY
IN TERRESTRIAL NETWORKS
Examiner : To Be Assigned
Group Art Unit : To Be Assigned

Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

SIR:

Please amend the above-identified application before examination as follows:

In The Specification:

On page 1, before line 1, insert --Background Information--.

On page 1, line 1, after "The" insert --present--.

On page 1, line 3, delete "according to the preambles of Claim 1 and Claim 7".

On page 1, after line 25, insert:

--German Published Patent Application No. 43 08 161 describes a system for telecommunication via satellites, which utilizes at least one transmitting station and at least one receiving station, and at least one monitoring circuit for monitoring the signal transmitted from a transmitting station via the satellite link and received by a receiving station. In response to interference of the signal, an alternative link results because provision is made for at least one network module which automatically produces a communications link between a transmitting station and a receiving station via a switched network when one parameter of the signal assumes critical values caused, for example, by weather, and which releases this link again when the parameter of the signal assumes uncritical values. Thus, this system is clearly limited to the monitoring of transmission quality in satellite systems, with the possibility of

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switching automatically to fixed networks when quality deficiencies have been ascertained in the signal.

In addition, in Japanese Laid-Open Patent Application No. 01 293020, a method is described for replacing defective satellite transmission channels by lines of fixed networks. Just as the method described above, this method is not usable for the case when lines of a fixed network break down and free transmission capacity of satellite systems is used for them.--

On page 1, line 26, insert --Summary Of The Invention--.

On page 1, line 27, change "The" to --An--.

On page 1, line 27, before "invention" insert --present--.

On page 2, delete lines 5-13.

On page 3, line 22, before "invention" insert --present--.

On page 3, delete lines 24-30 and in their place insert:

--Brief Description Of The Drawings

Figure 1 shows a basic circuit diagram of a system according to the present invention for the substitution of out-of-order lines of a terrestrial network by alternative routing through a satellite connection.

Figure 2 shows a carrier pool for use in accordance with the present invention.

Figure 3A shows a first flow chart according to the present invention.

Figure 3B shows a second flow chart according to the present invention.

Detailed Description--.

On page 4, line 5, change "Fig." to --Figure--.

On page 4, line 7, change "Fig." to --Figure--.

On page 5, line 13, change "Fig." to --Figure--.

On page 5, line 19, change "Fig." to --Figure--.

On page 11, line 30, change "Fig." to --Figures--.

On page 11, line 32, after “not” insert --(step 100)--.

On page 11, line 34, after “network” insert --(step 105)--.

On page 11, line 35, after “route” insert --(step 120)--.

On page 12, line 1, after “connection” insert --(step 125)--.

On page 12, line 2, change “Fig.” (Each occurrence) to --Figure--.

On page 12, line 3, after “connection” insert --(step 115)--.

On page 12, line 5, change “Fig.” to --Figures--.

On page 12, line 7, after “free” insert --(steps 135, 145)--.

On page 12, line 9, change “Fig.” to --Figure--.

On page 12, line 10, before “;” insert --(step 200)--.

On page 12, line 11, after “terminal” insert --(step 205)--.

On page 12, line 14, after “slave” insert --(step 210)--.

On page 12, line 14, after “channel” insert --(step 235)--.

On page 12, line 15, after “out” insert --(step 240)--.

On page 12, line 16, after “on” insert --(step 245)--.

On page 12, line 17, after “terminal” insert --(step 250)--.

On page 12, line 18, after “terminal” insert --(step 215)--.

On page 12, line 18, after “correct” insert --(step 220)--.

On page 12, line 19, after “router” insert --(step 225)--.

On page 12, line 21, after “terminal” insert --(step 250)--.

On page 12, line 21, after “3B” insert --(step 220)--.

On page 12, line 21, change “Fig.” to --Figure--.

On page 12, line 22, after “available” insert --(step 230)--.

On page 12, line 25, change “Fig.” to --Figure--.

On page 12, line 26, after “terminal” insert --(step 205)--.

On page 12, line 27, after “master” insert --(step 255)--.

On page 12, line 28, after “confirmation” insert --(step 260)--.

On page 12, line 30, after “available” insert --(step 265)--.

On page 12, line 30, change “Fig.” to --Figure--.

On page 12, line 33, change “Fig.” to --Figure--.

On page 12, line 35, after "out" insert --(step 155)--.

On page 12, line 35, after "identical" insert --(step 165)--.

On page 13, line 2, before "." insert --(steps 175, 180)--.

On page 13, line 2, after "free" insert --(step 185)--.

On page 13, line 3, after "address" insert --(step 155)--.

On page 13, line 4, before "." insert --(step 190)--.

On page 13, line 5, after "expired" insert --(step 170)--.

On page 13, line 6, after "expired" insert --(step 170)--.

On page 13, line 7, before "." insert --(steps 130, 140)--.

On page 13, line 7, after "free" insert --(step 150)--.

On page 13, line 8, after "again" insert --(step 155)--.

On page 13, line 9, after "free" insert --(step 150)--.

On page 13, line 9, before "," (second occurrence) insert --(step 160)--.

On page 13, delete lines 12-14.

On page 16, line 1, change "Patent Claims" to --What Is Claimed Is--.

In The Claims:

Please cancel original claims 1-14 and cancel substitute claims 1, 7, and 9, without prejudice, and add new claims 15-28 as follows:

15. (New) A process for controlling a use of a satellite transmission capacity in order to achieve a substitution of out-of-order data lines in terrestrial networks such that an alternative routing via a satellite is initiated and monitored and an assignment is effected with respect to the alternative routing, the process comprising the steps of:

causing a plurality of controllers controlled by software and respectively allocated to one of a master terminal and a slave terminal to achieve a control that is automatic, decentralized, and local;

causing the plurality of controllers to detect a need for the alternative routing based on an analysis of a data control signal from a data transmission device of a user;

using a control software to monitor locally and automatically an occupancy state of the satellite transmission capacity; and

carrying out software-controlled alternative routing operations via a respective one of the plurality of controllers.

16. (New) The process according to claim 15, wherein:

the control software is stored in a respective one of the plurality of controllers,

components of a respective one of the master terminal and the slave terminal are controlled and monitored in a waiting state in the case of the alternative routing, and

the stored control software reacts to control signals of a customer data device without influencing customer data of the customer data device.

17. (New) The process according to claim 15, wherein:

an automatic and decentralized control of the use of the satellite transmission capacity for the substitution of the out-of-order lines in the terrestrial networks and the alternative routing via a second transmission medium, including an automatic monitoring of capacity use, are effected via the control software,

the occupancy state of the satellite transmission capacity is monitored locally, and

a failure of a terrestrial call connection is detected locally.

18. (New) The process according to claim 15, further comprising the steps of:

using a passive hub to collect connection data and preconfigure the master terminal and the slave terminal during an initial installation;

if a change in a network layout occurs, connecting the passive hub to the master terminal and the slave terminal via one of a telephone-modem link, an ISDN connection, a GSM connection with modem, and a satellite connection within an available network capacity.

19. (New) The process according to claim 15, further comprising the step of:
synchronizing each one of the master terminal and the slave terminal
by integrating a DCF77 receiver in each one of the master terminal and the slave
terminal, wherein a standard time is used as a system time for performing a clocking.

20. (New) The process according to claim 15 further comprising the steps of:
switching on a transmitter carrier of an affected satellite modem;
receiving the transmitter carrier by each non-affected network terminal; and
using a transmission capacity of an asynchronous overhead of the satellite
modem to transmit destination addresses, wherein a free-running alternative routing
via a different medium is available when a terrestrial transmission path is out of order.

21. (New) A circuit arrangement for implementing a process that controls a use of a
satellite transmission capacity in order to achieve a substitution of out-of-order data lines in
terrestrial networks such that an alternative routing via a satellite is initiated and monitored
and an assignment is effected with respect to the alternative routing, the circuit arrangement
comprising:
a plurality of backup terminals, each one of the backup terminals corresponding to
one of a master terminal and a slave terminal and each one of the backup terminals
including:
an antenna,
a carrier, and
a satellite, wherein:
each one of the backup terminals is connected to a corresponding one of a
plurality of satellite modems in order to achieve an automatic switchover to free
transmission satellite channels when the alternative routing of at least one of the
terrestrial networks occurs,
each one of the backup terminals is provided with a corresponding one of a
plurality of independent, software-controlled, decentrally disposed, local, and intelligent
control units,

each one of the control units is allocated a corresponding one of a plurality of other modems,

each one of the plurality of control units is connected to a corresponding one of a plurality of routers, and

each one of the plurality of routers is capable of being connected to customer devices, customer terminals, and to communication lines.

22. (New) The circuit arrangement according to claim 21, further comprising:

- a hub connected via one of the plurality of other modems to the at least one of the terrestrial networks, wherein the hub is equipped with software for communicating via a terrestrial connection with the plurality of control units, and wherein the plurality of control units and the hub are each provided with a respective addressing system.

23. (New) The circuit arrangement according to claim 22, wherein:

- the hub registers a use of a plurality of transmission pools,
- the hub includes information about individual transmission channels and about an assignment of each one of the individual transmission channels to a respective one of the plurality of transmission pools,
- in the case of a fault, the plurality of control units transmits modem parameters to the hub to achieve an initial fault location, and
- a carrier pool is equipped with a plurality of satellite transmission channels of a defined data rate.

24. (New) The circuit arrangement according to claim 23, wherein:

- the individual transmission channels are used according to a first come, first served basis,
- one of a reserving and a prioritization of the individual transmission channels is achieved,
- the transmission pools are monitored according to a centralized online monitoring of a pool use, and

all connections to be alternatively routed are symmetrical duplex channels with identical data rates in a send direction and a receive direction.

25. (New) The circuit arrangement according to claim 23, wherein the individual transmission channels are combined into channel pairs having mid-frequencies.
26. (New) The circuit arrangement according to claim 22, wherein:
 - each one of the plurality of control units are connected via a communication line to a corresponding one of the plurality of satellite modems and to a plurality of control lines,
 - each one of the plurality of satellite modems is in communication with a corresponding satellite antenna of each backup terminal, and
 - the antenna of one of the plurality of backup terminals communicates with the antenna of another one of the plurality of backup terminals via defined carrier frequencies of the satellite.
27. (New) The circuit arrangement according to claim 22, wherein:
 - each one of the satellite modems and an associated one of the control units are arranged as an internal unit,
 - one of the plurality of backup terminals is arranged as a satellite external unit that includes the antenna, the carrier, the satellite, and a connection to an associated internal unit, and
 - a connection is made between the control unit of each of the internal units and the at least one of the terrestrial networks.
28. (New) The circuit arrangement according to claim 22, wherein:
 - the hub includes a personal computer that is connected via an interface card to the at least one of the terrestrial networks,
 - the hub is connected to other networks in order to forward connection data relating to at least one of a tariffing operation and an invoicing operation.

In The Abstract:

Delete the present Abstract and in its place insert the following:

--Abstract Of The Disclosure

A process and system for controlling the use of satellite transmission capacity in terrestrial networks for the substitution of out-of-order data lines. The circuit/process is characterized in that an independent, local control apparatus, which monitors a backup terminal with the software specially written for this application, cooperates in limited manner with the data transmission device of the user and, based on the analysis of a data control signal, detects the need for alternative routing. Via communication lines and modems, the control apparatus switches on the transmission carrier of the affected satellite modem which is connected to a satellite antenna. The satellite antennas are in communication with the satellite via the transmission carrier. All other, non-affected terminals in the network also receive the transmission carrier of the affected satellite modem. The transmission capacity of the asynchronous overhead of the satellite modem is used for the transmission of destination addresses. A hub is provided, which is connected via an interface card or a modem to the terrestrial network that, in turn, is connected via lines to routers. The line is assumed to be out of order. Customer devices or terminals are connected via lines to the routers. The system-specific software-controlled circuit permits independent, decentralized administration of the satellite transmission channels by many satellite terminals without participation of a controlling central station. Thus, even when the terrestrial transmission path is out of order, a free-running alternative routing via a different medium has been achieved.--.

Remarks

This Preliminary Amendment cancels original claims 1-14 and substitute claims 1, 7, and 9 in the underlying PCT Application No. PCT/EP98/03747, and adds new claims 15-28. The new claims do not add new matter to the application but do conform the claims to U.S. Patent and Trademark Office rules.

The amendments to the specification and abstract are to conform the specification and abstract to U.S. Patent and Trademark Office rules. The amendments to the specification and abstract do not introduce new matter into the application.

The underlying PCT application includes a Search Report dated April 15, 1999, and an International Preliminary Examination Report dated September 8, 1999, copies of which are submitted herewith.

Applicant asserts that the present invention is new, non-obvious, and useful. Consideration and allowance of the claims are requested.

Respectfully submitted,

KENYON & KENYON

By: *Les Magne (Reg. No. 41,172)*

Dated: 12/30/99

By: Richard L. Mayer
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09/462017

428 Rec'd PCT/PTO 30 DEC 1999

[2345/112]

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PROCESS AND SYSTEM FOR CONTROLLING THE USE OF SATELLITE
TRANSMISSION CAPACITY IN TERRESTRIAL NETWORKS

The invention relates to a process and a circuit arrangement for controlling the use of satellite transmission capacity for the substitution of out-of-order data lines in terrestrial networks according to the preambles of Claim 1 and Claim 7, respectively.

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Switched trunk groups in voice and data networks are generally operated in a two-way alternate manner between computer-controlled switching devices. With this mode of operation, both switching devices are able, independently of each other, to access and occupy unoccupied trunks of the group. If certain data lines go down completely, this also permits automatic alternative routing to an unoccupied and operable data line of a terrestrial network.

DOCUMENT FILED

The known traffic management processes are summarized and outlined in CCITT Recommendation E.412: "Network Management Controls" (10/92). However, it is also known to remedy out-of-order data lines in terrestrial networks by using spare satellite transmission capacity. Particularly with regard to the access lines, alternative routing via satellite requires a manual initiation after a transmission capacity request has been sent to a central station, a backward channel which is carried via terrestrial lines or via satellite being used for this purpose.

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The manual initiation of alternative routing according to the related art is time-intensive. It may even be necessary for connection configurations to be transmitted to the locations involved, and a backward channel must be reliably available in the case of an alternative routing request. This may lead to problems, - particularly in the case of a terrestrial backward channel, for example, if the backward channel and user information channel are carried in one access line - because no backward channel is directly available.

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The object of the invention is to create a process and a system/circuit arrangement which automatically initiate and monitor alternative routing via satellite irrespective of the

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transmission medium that might be out-of-order, the satellite transmission capacity available for alternative routing purposes being usable by a larger number of users and assignment in the case of alternative routing being autonomous, i.e., automatic.

5 The objective of the invention is achieved by a process described in the characterizing part of Claim 1.

The objective with regard to a system/circuit arrangement is achieved according to the invention as described in the characterizing part of claim 7.

10 Further features and refinements of the invention are described in the characterizing parts of Claims 2 to 6 with regard to the process, and in the characterizing parts of Claims 8 through 14 with regard to the system/circuit arrangement.

20 The advantages of such a design approach lie in the fact that, in the case of alternative routing, a larger number of satellite terminals is able to access a smaller number of satellite transmission channels with the aid of an automatic, decentralized, local and intelligent control unit. The control software necessary for this purpose is stored in the respective local control unit. It controls and monitors the components of the terminal in the waiting state and in the case of alternative routing. It also takes over the automatic control of connection setup and tear-down; in so doing, the software reacts to control signals of the customer data device without, however, influencing the customer data itself. The automatic and decentralized control of the use of satellite transmission capacity for the substitution of out-of-order lines in terrestrial networks and the alternative routing via a second transmission medium, namely satellite transmission, including automatic monitoring of capacity use, are effected via software control, the occupancy state of the satellite transmission capacity being monitored locally and the failure of the terrestrial call connection being detected locally, and the alternative routing to satellite transmission being carried out independently and automatically. In this context, the function of the hub is passive and is used for collecting call data and preconfiguring the individual terminals during initial installation and if there is a change in the network layout. The updating of the network software can be transmitted to the terminal

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locations without direct involvement of personnel. Further features, such as the reserving of spare satellite capacity, are readily possible. The hub can be connected to the terminals in various ways, such as via a telephone-modem link, via an ISDN connection, via a GSM connection with modem, via a satellite connection within the capacity available in the network, etc. All the satellite terminals can be synchronized by integrating a "DCF77" receiver in each terminal, the standard time being used as the system time for clocking.

The above-described measures, process steps and system for the first time permit an independent, local control which monitors the backup terminal using the software specially written for this application, cooperates in limited manner with the data transmission device of the user and detects the need for alternative routing based on the analysis of a data control signal. The control apparatus, i.e. the system, switches on the transmission carrier of the affected satellite modem which is then received by all other, non-affected terminals in the network. The transmission capacity of the asynchronous overhead of the satellite modem is used for the transmission of destination addresses. The independent and decentralized control or administration of the satellite transmission channels of a pool by many satellite terminals without participation of a controlling central station means that, even when the terrestrial transmission path is out of order, there is the possibility of free-running alternative routing via a different medium.

Further features and refinements of the process and circuit arrangement or system according to the invention come to light from the exemplary embodiments described in the following.

The invention will now be described in detail with reference to exemplary embodiments shown in the drawing, the terms used in the appended lists of definitions and reference characters being used in the specification, in the claims and in the abstract.

Fig. 1 shows a basic circuit diagram of a system for the substitution of out-of-order lines of a terrestrial network by alternative routing through a satellite connection;

Fig. 2 shows a carrier pool; and

Fig. 3A+B show basic flow charts for the process.

Fig. 1 shows a basic circuit diagram required for implementing the system and process for the automatic, decentralized control of the use of satellite transmission capacity for the substitution of out-of-order data lines in terrestrial networks. Fig. 1 shows a terrestrial network 1 which is connected via each of lines 2 and 3 to a router or similar circuit 6. In the example shown, it is assumed that line 2 is out of order. Terrestrial network 1 is also connected to a "hub" 4 via a modem 5. Routers 6 are each connected to customer devices 8 and to terminals 9 for data input and output. In addition, routers 6 are each connected to a stored-program controller 7, in each case via a line 12. Furthermore, each of the two stored-program controllers 7 is connected to a modem 5, via which stored-program controllers 7 are able to enter into communication via a line 11 with hub 4, for example for the reporting of detected equipment faults in the free-line state. Stored-program controllers 7 are each connected via a line 13 to a satellite modem 15. There are also connections via control lines 14 and 17. The two modems 15 are each in communication with a satellite antenna 18, the satellite antennas 18 being in communication with each other by way of a satellite 20 via certain carrier frequencies f_n 19.

A backup terminal 16 or 16' is composed of:

- the satellite external unit, antenna 18, carrier 19 and satellite 20,
- the connection to the internal unit, and
- the internal unit with:
 - satellite modem (sat modem) 15 and

control device 7 = stored-program controller

connection of stored-program controller 7 to the terrestrial switched network 1 via modem 5 and line 11.

Hub 4 is made of a PC which is connected via a suitable interface card to terrestrial network 1. The PC may, where appropriate, be connected to other networks for the forwarding of the call data for tariffing/invoicing purposes. The PC is provided with a software which is able to communicate with the individual stored-program controllers 7 of backup terminals 16, 16' via

terrestrial connection 11. Hub 4 and stored-program controller 7 each have their own addressing system. If necessary, hub 4 can enter into contact with stored-program controllers 7 of the individual terminals, for example regularly at the month's end in order to interrogate the call data file.

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The creation and transfer of reconfiguration data to the individual terminals is manually initiated and monitored. Hub 4 is able to register the use of a plurality of transmission channel pools, and has knowledge of the individual transmission channels (frequencies, data rate) as well as of their assignment to the respective pools. There is no online monitoring of the use of the transmission channels. In cases of faults, stored-program controllers 7 report the modem parameters to hub 4 for initial fault location.

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Fig. 2 shows a carrier pool having a plurality of satellite transmission channels $f_1 - f_{n+1}$ of a defined data rate. Hereinbelow, the functions of the individual components as well as their modes of operation and the interaction between them are described.

The backup network - which, strictly speaking, is not a "network" at all, because point-to-point connection choice is not possible - includes a pool of satellite transmission channels which will be described later with reference to Fig. 2 and which can be employed specifically for use in backup networks with prepared terminals when there is a need for alternative routing. Many terminals share a small number of satellite transmission channels. There is no central authorization check for a backup connection setup. The use of the transmission channels is on a first come, first served basis. The reserving of transmission channels or prioritization in the use of the transmission channels is basically possible, as is the central online monitoring of the use of the pool. All connections to be alternatively switched are symmetrical duplex channels (identical data rate in the send and receive directions). The individual transmission channels are combined into channel pairs having the mid-frequencies f_n/f_{n+1} ($n=1, 3, 5, \dots$). In the original state of the backup network, which is always desired, all transmission channels are unused and the transmission carriers of all approved terminals in the network are switched off; in this case, approved means those terminals which have been registered for the lawful use of the transmission channels. At all terminals, the sat modems are set to receive the first transmission channel (f_1); furthermore, it is assumed that all the sat modems used can be switched to a "loop-back" mode. Thus, an unauthorized data output can be prevented, possibly when synchronizing to any carrier 19 if the addresses are not identical. Since no terminal is transmitting, all sat modems 15 are in the syncloss state (synchronization loss = no reception

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and therefore no synchronization to a reception signal), which is communicated to stored-program controller 7 (SPS 7) via an interface and line 17. Stored-program controller 7 monitors the sat modem status and an output of a router 6 or of the data terminal, such as terminal 9, which signals detection of the failure of terrestrial data line 2. A terrestrial line failure (backup case) is normally detected at both points of a connection and is communicated by the respective router 6 to stored-program controller 7 in such a form that the DTRA signal in the data stream from router 6 is evaluated (potential change). In order to prevent a protracted search process and therefore in order to accelerate alternative routing, in each point-to-point connection, one terminal is given a priority position as master 16 vis-à-vis the other terminal as slave 16'; only the master 16 is enabled under software control to initiate alternative routing.

As soon as at the location, for example of terminals 16, 16', routers 6 determine the failure of terrestrial line 2 of a connection, the respective stored-program controller 7 detects the potential change of the DTR signal. Stored-program controller 7 of terminal 16 switches on transmission carrier f_1 at modem 15 (M+C interface), which signals the start of tariffing and changes the setting of the receiving frequency to f_2 . Master stored-program controller 7 transmits connection information via line 14 to terminal 16' (slave) until the connection is established, max. for $t_1=a$ seconds.

The connection information contains:

- destination address (terminal 16'),
- transmission frequency f_2 to be set by terminal 16',
- data rate,
- request to switch on transmission carrier f_2 .

Although normally known, frequency and data rate are transmitted for checking purposes and in order to ensure the compatibility of the modem settings. If not identical, termination of connection setup for security reasons; prevention of disturbance of others by possibly impermissible carrier activation.

All terminals (except terminal 16) receive f_1 (modem sync). The connection information is evaluated by all stored-program controllers 7. On the basis of the destination address, terminal 16' detects the connection request which is directed to it; stored-program controller 7 checks the setting data and switches on transmission carrier f_2 ; after the connection is established, the

terminal's own address and the current setting data are transmitted as confirmation via lines 14 to terminal 16. The modem terminal 16 synchronizes to f_2 and evaluates the transmitted data. Both stored-program controllers 7 detect the existence of the backup connection, cancel, where appropriate, the "loop-back" mode of the participating modems and forward this, where appropriate, as starting signal (DTRB signal: potential change) to the respective router 5 7.

Hereinbelow, the connection of stored-program controller 7 to hub 4 (optional, as expansion of performance capability) is described. After the occurrence of a backup case, stored-program controllers 7 of affected terminals 9 attempt to report the fault to hub 4 via terrestrial switched 10 line 2 or 3. Since, in the majority of cases, particularly in the exchange area, the data line and the ISDN line are carried in one cable, stored-program controller 7 of out-of-order line section 15 2 will attempt in vain to reach hub 4. Stored-program controller 7 of line section 3, which is not out of order, reaches hub 4. Hub 4 recognizes the message and deduces from the absence of a message from the second terminal that there is a fault, which leads to an indication on hub 4 (monitoring computer). If the second message is also received, it is necessary to provide an indication capable of initiating a manual investigation of the SPS message. In an existing connection, stored-program controller 7 monitors the modem sync and, if applicable, registers the cause of an unscheduled connection termination. Stored-program controllers 7 20 themselves exchange monitoring data, such as their own addresses, via line 14 in both directions. Routers 6 of both terminals detect, for example through regular polling, the return of terrestrial line 2; the participating stored-program controllers 7 ascertain this through a renewed potential change of the DTR signal. Via line 14, master stored-program controller 7 25 requests slave stored-program controller 7 to switch off carrier f_2 of modem 15. The modem of terminal 16 registers syncloss f_2 , which is taken over by stored-program controller 7 via M+C interface 17. Stored-program controller 7 thereupon likewise switches off carrier f_1 (end of tariffing) and again sets modem 15 to receive f_1 . Modem 15 of terminal 16 registers syncloss f_1 , and remains on reception of f_1 . If applicable, both modems 15 are switched again to "loop-back mode" by stored-program controller 7. After successful connection tear-down, 30 both stored-program controllers 7 independently inform hub 4, via terrestrial switched lines 2 and 3, of their return to the waiting state.

As already described, all non-active terminals receive the connection information. After registration of the occupied carrier pair f_1/f_2 in stored-program controller 7, all non-addressed 35 terminals are set to receive the next carrier pair f_3 and f_n , respectively; with $n=1, 3, 5, \dots$. In

order to be able to return to the original state within a reasonable time, after a waiting time of
5 $t_2 = b$ sec. (with b , for example, 15 sec.), the respective stored-program controller 7 of each
terminal not involved in a call switches modem 15 back to the reception of f_1 . If carrier 19 is
still occupied, i.e. if another terminal is using that carrier, then modem 15 synchronizes
10 (modem sync). Stored-program controller 7 detects the modem sync and, in order to
guarantee stable reception, after $t_3 = c$ sec. (15 sec., for example) switches modem 15 back
15 to the reception of f_3/f_n . After the waiting time $t_2 = b$ sec., there is a renewed check for f_1 . If
there is no reception of f_1 , i.e. modem syncloss, this is an indicator of the non-occupation of
carrier pair f_1/f_n . All terminals/modems which cannot synchronize to f_1 remain on the reception
20 of f_1 . If, during an already existing alternative routing, i.e. f_1/f_2 (f_n/f_{n+1}) occupied, there is a
further case of alternative routing, all non-active terminals are in a non-synchronized receiving
situation. Terminals n (3, for example) and $n+1$ (4, for example) are requested for the
25 alternative routing; terminal 3 controls the connection setup. All non-participating terminals
are set to receive the next free carrier f_n and check, according to waiting time $t_2 = b$, for
carriers f_1 and f_n , until, in the ideal case, they remain on the reception of f_1 , the original state.
The reaction time of the "network", i.e. the time required by a terminal after detection of a
terrestrial line failure to provide a backup connection, is a function of the number of carriers
kept available in the pool, the duration of the checking and routing operations of the modem to
determine the availability of a carrier pair, and possibly of other, as yet unidentified influences.
30 Since all terminals are operated in non-synchronized manner, all checking and routing
operations are performed individually. Thus, after the existence of an active alternative
routing, any further alternative routing request may be delayed in that, for example, terminal
16 (master) is currently checking on an occupied frequency and is therefore unable to react,
35 and terminal 16' (slave) remains in some waiting position which, however, is left again after t_2
= b sec. in order to check for the first free carrier. Therefore, in order to set up the desired
alternative routing, after the occupied frequency has been left, terminal 16 must seek the next
free carrier, remain there and, after activation of carrier f_n , emit its connection request
continuously for $t_1 = a$ sec. until terminal 16' has synchronized to f_n and detects the connection
request. This is then followed by the already described connection setup. If connection
failures occur simultaneously on a plurality of terrestrial lines, there is the risk of multiple
transmissions of various master terminals on one transmission channel (exception, see under
star network). There may be collisions which prevent a reliable synchronization of modems 15
of respective slave terminals 16'. Slave modems 15 may fall into an undependable operating
state which is communicated as syncloss to stored-program controller 7. Slave stored-

program controller 7 now assumes that the transmission channel is unoccupied and remains there for the waiting time $t_2 = b$ sec.; thereafter, checking is started once again for the first free transmission channel f_i . After transmission of the connection request, master terminals 16 expect reception of slave terminal 16' on f_{n+1} within a time window of $t_1 = a$ min. If there is no synchronization to f_{n+1} within this time window, then transmission carrier f_n is switched off and the search for the first free transmission channel is initiated once again by master stored-program controller 7. If master terminal 16 is already on the first transmission channel, then stored-program controller 7 restarts a connection setup via f_1 , after a statistical waiting time of $t_5 = e$ sec.

Use in a star network, in which there is a plurality of connections to the external stations from the star point, is to be regarded as a special case/exception. The star point in this case is always master terminal 16, which initiates the switching of, in some instances, a plurality of alternatively routed calls (one modem for each). If the terrestrial line to the star point itself is out of order, then connections stored in advance in stored-program controller 7 are set up with first priority. No information about the number of connections then established is possible if several networks have access to the pool channels. Furthermore, if there is a shortage of transmission channels relative to the number of terminals, such an alternative routing case may result in complete utilization of the pool. Any other occurring alternative routing cases are then rejected; the terminals check for free transmission channels. There may be an indication on stored-program controller 7. Priority control should then be provided.

Fully inter-meshed networks are to be regarded as a further special case in which, in the ideal case, each terminal is able to reach each other terminal by a kind of dial-up connection. This is not directly possible with the master/slave relationship described here. However, it is readily conceivable to make a modification such that, for alternative routing in such networks, defined traffic relationships are stored in advance in stored-program controller 7, including the respective functions of the locations as master or slave. The alternative routing then corresponds to a normal point-to-point connection.

If a deterioration in transmission quality is detected during an existing alternatively routed connection, for example as a result of an increased bit error rate which finally leads to a syncloss of one of the two links, then, after a waiting time of $t_6 = f$ min, the entire connection is torn down, initiated by the respective stored-program controller 7 (master or slave). At the same time, an alarm is generated. If master stored-program controller 7 does not discover a

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device fault of its own, it can optimally initiate a new connection setup after a waiting time $t_7 = g$ sec. If this does not result in a successful connection, there is a continuous alarm in stored-program controller 7 and possibly a message via line 11 and terrestrial dial-up connection 1 to hub 4.

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An undependable operating state of a master terminal 16, ready to receive on f_1 , may occur if the reception field strength has fallen to such an extent at the location due to weather conditions, that any backup case of another location cannot be detected because modem 15 remains in syncloss and therefore indicates a free channel pair. However, after a weather improvement and an increase in reception field strength, modem 15 synchronizes and detects the occupied state. Stored-program controller 7 then initiates the usual search. If, in the described undependable operating state, a backup case additionally occurs in the connection of master terminal 16, this will activate transmission carrier f_1 , and therefore, with the carrier pair already occupied, cause a fault as a result of the double transmission. The already existing connection may be interrupted because of this. The interruption may be prevented if t_6 (waiting time in the case of syncloss) is set to be greater than t_1 (waiting time of master for response from slave), since, if there is no response, master terminal 16 breaks off the transmission of f_1 again and searches for another free carrier pair. In this context, it is assumed that the associated slave terminal 16' does not have faulty reception and has therefore detected the occupation of f_1/f_n . Stored-program controller 7 monitors modem 15 and/or, if possible, the external unit locally at each location via M+C interface 17. If, in so doing, faults are detected which are not due to configuration faults, i.e. which cannot be remedied by reconfiguration, then a connection setup is not possible.

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Devices for visual and audible alarm generation can be connected to or integrated into stored-program controller 7 for the local indication of faults and call failures. Nonestablished backup connections owing to occupied states, all transmission channels occupied, can be indicated visually and/or audibly. All error messages are stored in stored-program controller 7.

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Terminals 16, 16' are monitored by stored-program controller 7. Discovered anomalies are additionally reported to hub 4 directly via terrestrial dial-up connection 1 for local storage. The FBA process used by DTAG is employed for this purpose.

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In the case of local data recording, all alternatively routed calls and connection setup attempts are stored in stored-program controller 7. The following are to be recorded: start and end of

connection, type of end of connection, regular/aborted, cause of abort.

In the case of central recording, at a time stored in stored-program controller 7, the individual terminals forward to the hub the calls handled over a certain period, such as a month.

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Stored-program controller 7 stores all locally required data needed for

- communication with its own modem, router/DTE, modem of the distant station, possibly external unit;
- connection setup with distant station(s): address(es), frequencies of transmission channels, transmitting power, corresponding data rate(s) and link request for each location;
- alarm generation concept;
- communication with the hub.

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Stored-program controller 7 works independently without a connected input terminal. All operations are carried out according to the above-indicated process. The software required for this purpose must be stored in a storage device which, for example, if so requested by the customer, may also be in the form of a non-volatile storage device.

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The connection data is sent to hub 4 for tariffing and traffic evaluation purposes if required, this being done regularly by temporary dial-up via terrestrial network 1.

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Reconfigurations can be easily carried out, the individual reconfiguration of possibly each backup terminal being required for changes with regard to the number and/or frequencies of the transmission channels, data rate, origin/destination locations, master/slave relationship etc. The loading of new software is accomplished from hub 4 via the terrestrial connection. For this purpose, the reconfiguration is created in hub 4 and is transferred to stored-program controllers 7 of the individual terminals after dialing up.

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Fig. 3A and 3B show basic flow charts representing a process sequence for controlling the use of satellite transmission capacity for the substitution of out-of-order data lines in terrestrial networks. The router first of all checks whether the terrestrial line is in order or not. If it is in order, this is indicated by a command or a "yes" signal and the router establishes the connection via the terrestrial network. Conversely, if in response to the check, a "no" signal is generated, then the router initiates a signal to alternatively route and waits for the satellite

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connection. If a satellite connection is available, indicated by the circled 3 in the diagram according to Fig. 3A and Fig. 3B, the router connection is established via a satellite connection. In the following, the generation of the message to the router that a satellite connection is available, represented by the circled 3, is explained with reference to the flow charts in Fig. 3A and 3B. When the router transmits the signal to alternatively route, the stored-program controller detects the need to alternatively route and therefore the need to check whether a satellite channel, i.e. satellite capacity is free. If there is spare satellite capacity, then the check is answered with a "yes" and a corresponding signal, represented by the circled 1, is triggered. This signal is sent to the master terminal, as shown in Fig. 3B.

Consequently, the sat modem of the master is set to receive the frequency f_{n+1} ; at the same time, the transmitter is also switched on and the address is transmitted to the slave terminal, it being necessary also for the address-concordance signal, represented by the circled 2, to be present. As shown in the diagram in Fig. 3B, the master terminal must then wait for a response or answerback from the slave. If the slave terminal remains on the satellite channel, the evaluation of the message from the master is then carried out and, as a result thereof, transmission frequency f_{n+1} is set and transmitter f_{n+1} is switched on. Thereafter, the slave terminal transmits its own address to the master terminal, which waits to receive the answerback from the slave terminal. If the reception is correct, then confirmation is sent to the waiting slave terminal and authorization is sent to the router. Before waiting for confirmation from the master terminal, the address of the slave terminal is transmitted to the master terminal. If reception is correct, identified by "yes" in Fig. 3B, the stored-program controller SPS sends a message to the router that the satellite connection is available, as a result of which the message, represented by the circled 3, is sent and the router is thus able to leave its waiting position and utilize the satellite connection. Conversely, if reception was not correct, represented by a "no" in Fig. 3B, then, as already stated, the address is transmitted to the slave terminal. If reception was correct, then, as already stated, this is indicated by a message identified by "yes". The slave terminal waits for the confirmation of the master, evaluates the confirmation and, if concordant, then forwards this to the controller, as a result of which the message from the controller of the slave terminal is sent to the router to the effect that the satellite connection is available, indicated by the circled 3 in Fig. 3B.

In the following, the address-concordance message, indicated by the circled 2, is described. If no satellite channel is free, this is indicated by a "no" message in Fig. 3A. Thereupon, a check and a comparison of the destination address with the "no" message as to whether satellite channel f_1 is free is carried out. Namely, if the addresses are not identical, represented by the

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"no" message, then the controller causes the corresponding modem to search for another free satellite channel f_n . If satellite channel f_n is not free, then there is a feedback to the checking and comparison circuit for the destination address. Conversely, if satellite channel f_n is free, then this is indicated by a "yes" message and the modem remains at frequency f_n . If timer t_2 has not expired, this is fed back by a message " f_n satellite channel free". Conversely, if timer t_2 has expired, this is indicated by a "yes" and the controller causes the modem to search for a free satellite channel f_i . If satellite channel f_i is not free, then a "no" message is generated and a check and comparison of the destination address is carried out once again. Conversely, if satellite channel f_i is free, then the modem remains at frequency f_i , and a message is generated according to the circled 1.

The flow chart shown in Fig. 3A and 3B represents just one possible variant for the implementation. It is also readily possible to make modifications to this flow chart without changing or departing from the subject matter of the invention.

Definitions

DAMA function:	Demand Assigned Multiple Access: Demand-oriented assignment of transmission capacity after request with changing destinations (switched network), usually with central capacity management;
Loop-back mode:	Setting possibilities in the satellite modem for forming loops in the transmission path in order to check and isolate individual functional components within the satellite modem;
M+C interface:	Monitoring and control interface of the satellite modem, by which it is possible to adjust and monitor the configuration of the satellite modem from outside;
Modem sync:	Demodulator of the satellite modem has synchronized to a received signal; connection via satellite usable;
Modem syncloss:	Demodulator of the satellite modem has lost received signal; connection interrupted;
Pool:	Number of several satellite transmission channels of one data rate;
Space segment capacity:	Transmission capacity in the satellite;
Satellite modem:	Modulator/demodulator which converts the terrestrial user-information data into the intermediate frequency level (70 MHz);
SPS:	Stored-program controller which independently executes monitoring and control functions.

List of reference numerals

- 1, Terrestrial network
- 2 ,3 Lines
- 4 Hub
- 5 Modem
- 6 Router
- 7 Controller
- 8 Customer devices
- 9 Terminals
- 10-14 Lines
- 15 Satellite modem
- 16, 16' Backup terminals
- 17 Lines
- 18 Satellite antenna
- 19 Carrier frequencies; carriers
- 20 Satellite

1. A process for controlling the use of satellite transmission capacity for the substitution of out-of-order data lines in terrestrial networks, alternative routing via satellite being initiated and monitored and assignment being effected in the case of alternative routing, characterized in that

in the case of alternative routing, controllers (7) allocated to master and slave terminals (16 and 16') and controlled by software take over control automatically, decentrally and locally, and detect the need for alternative routing based on the analysis of a data control signal from the data transmission device of the user; and

the occupancy state of the satellite transmission capacity is monitored locally and automatically via software control, and the alternative routing operations are carried out, controlled by software, via the respective decentralized, local and intelligent control unit (7).

2. The process as recited in Claim 1, characterized in that

the necessary control software is stored in the respective local control unit (7);

the components of the terminal (16 and 16', respectively) are thereby controlled and monitored in the waiting state and in the case of alternative routing; and

the stored software reacts to control signals of a customer data device without, however, influencing the customer data itself.

3. The process as recited in one of Claims 1 or 2, characterized in that

the automatic and decentralized control of the use of satellite transmission capacity for the substitution of out-of-order lines in terrestrial networks and the alternative routing via a second transmission medium, including automatic monitoring of capacity use, are effected via software control, the occupancy state of the satellite transmission capacity being monitored locally and the failure of the terrestrial call connection being detected locally.

4. The process as recited in one of Claims 1 through 3, characterized in that
a passive hub (4) is used for collecting connection data and preconfiguring the individual terminals (16 and 16') during initial installation and if there is a change in the network layout, the passive hub (4) being connected to the terminals (16, 16') either via a telephone-modem link, via an ISDN connection, via a GSM connection with modem or via a satellite connection within the capacity available in the network.

5. The process as recited in one of Claims 1 through 4, characterized in that
all satellite terminals (16 and 16') are synchronized by integrating a DCF77 receiver in each terminal, the standard time being used as the system time for clocking.

6. The process as recited in one of Claims 1 through 5, characterized in that
the transmitter carrier of the affected satellite modem is switched on in the case of alternative routing and is then also received by all other, non-affected terminals in the network;
the transmission capacity of the asynchronous overhead of the satellite modem is used for the transmission of destination addresses; and
even when the terrestrial transmission path is out of order, there is free-running alternative routing via a different medium.

7. A circuit arrangement for implementing the process as recited in one of Claims 1 through 6, characterized in that
a master terminal (16) and a slave terminal (16), each connected to a satellite modem (15), are connected to the terrestrial network (1) via independent, software-controlled, decentrally disposed, local and intelligent control units (7) with an associated modem (5) via routers (6), to which the customer devices (8) and terminals (9) are connected.

8. The circuit arrangement as recited in Claim 7, characterized in that connected via a modem (5) to the terrestrial network (1) is a hub (4) equipped with software which communicates via the terrestrial connection with the individual stored-program controllers (7) of the terminals (16, 16'), both the stored-program controllers (7) and the hub (4) having their own addressing system.

9. The circuit arrangement according to the preamble of Claim 7, characterized in that the hub (4) registers the use of a plurality of transmission pools; the hub (4) has knowledge about the individual transmission channels (such as frequencies and data rates) as well as about their assignment to the respective pools; in the case of a fault, the stored-program controllers (7) transmit the modem parameters to the hub (4) for initial fault location, a carrier pool being equipped with a plurality of satellite transmission channels ($f_n - f_{n+1}$) of a defined data rate.

10. The circuit arrangement as recited in Claim 9, characterized in that the transmission channels are used according to the principle of first come, first served; as an additional feature, there is the reserving of transmission channels or prioritization in the use of the transmission channels, as well as the centralized online monitoring of the pool use; and all connections to be alternatively routed are symmetrical duplex channels with identical data rates in the send and receive directions.

11. The circuit arrangement as recited in one of Claims 8 through 10, characterized in that the individual transmission channels are combined into channel pairs having the mid-frequencies (f_n/f_{n+1} ($n=1, 3, 5..$))).

12. The circuit arrangement as recited in one of Claims 8 through 11, characterized in that the stored-program controllers (7) are each connected via a line (13) to a satellite modem (15), and also to control lines (14 and 17);

the two modems (15) are each in communication with a satellite antenna (18), the satellite antennas (18) being in communication with each other via a satellite (20) by way of defined carrier frequencies (19).

13. The circuit arrangement as recited in one of Claims 8 through 12, characterized in that one terminal as backup terminal (16 or 16') is composed of a satellite external unit, including an antenna (18), a carrier (19) and a satellite (20), and also of a connection to the internal unit, and of the internal unit with the satellite modem (15) and the stored-program controller (7) as well as a connection of the stored-program controller (7) to the terrestrial switched network (1).

14. The circuit as recited in Claim 8 or 9, characterized in that the hub (4) is composed of a personal computer which is connected via an interface card to the terrestrial network (1) and, if applicable, is connected to other networks for the forwarding of the connection data for purposes of tariffing/invoicing.

ABSTRACT

The invention relates to a process and system for controlling the use of satellite transmission capacity in terrestrial networks for the substitution of out-of-order data lines. The circuit/process is characterized in that an independent, local control apparatus (7) - which monitors a backup terminal with the software specially written for this application - cooperates in limited manner with the data transmission device of the user and, based on the analysis of a data control signal, detects the need for alternative routing. Via lines (10 through 14) and modems (15), the control apparatus (7) switches on the transmission carrier (19) of the affected satellite modem (15) which is connected to a satellite antenna (18). The satellite antennas are in communication with the satellite (20) via the transmission carrier (19). All other, non-affected terminals in the network also receive the transmission carrier (19) of the affected satellite modem (15). The transmission capacity of the asynchronous overhead of the satellite modem (15) is used for the transmission of destination addresses. A hub (4) is provided, which is connected via an interface card or a modem (5) to the terrestrial network (1) that, in turn, is connected via lines (2 and 3) to routers (6). The line (2) is assumed to be out of order. Customer devices (8) or terminals (9) are connected via lines (10) to the routers (6). The system-specific software-controlled circuit permits independent, decentralized administration of the satellite transmission channels by many satellite terminals without participation of a controlling central station. Thus, even when the terrestrial transmission path is out of order, a free-running alternative routing via a different medium has been achieved.

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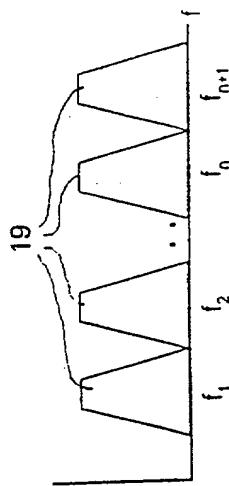
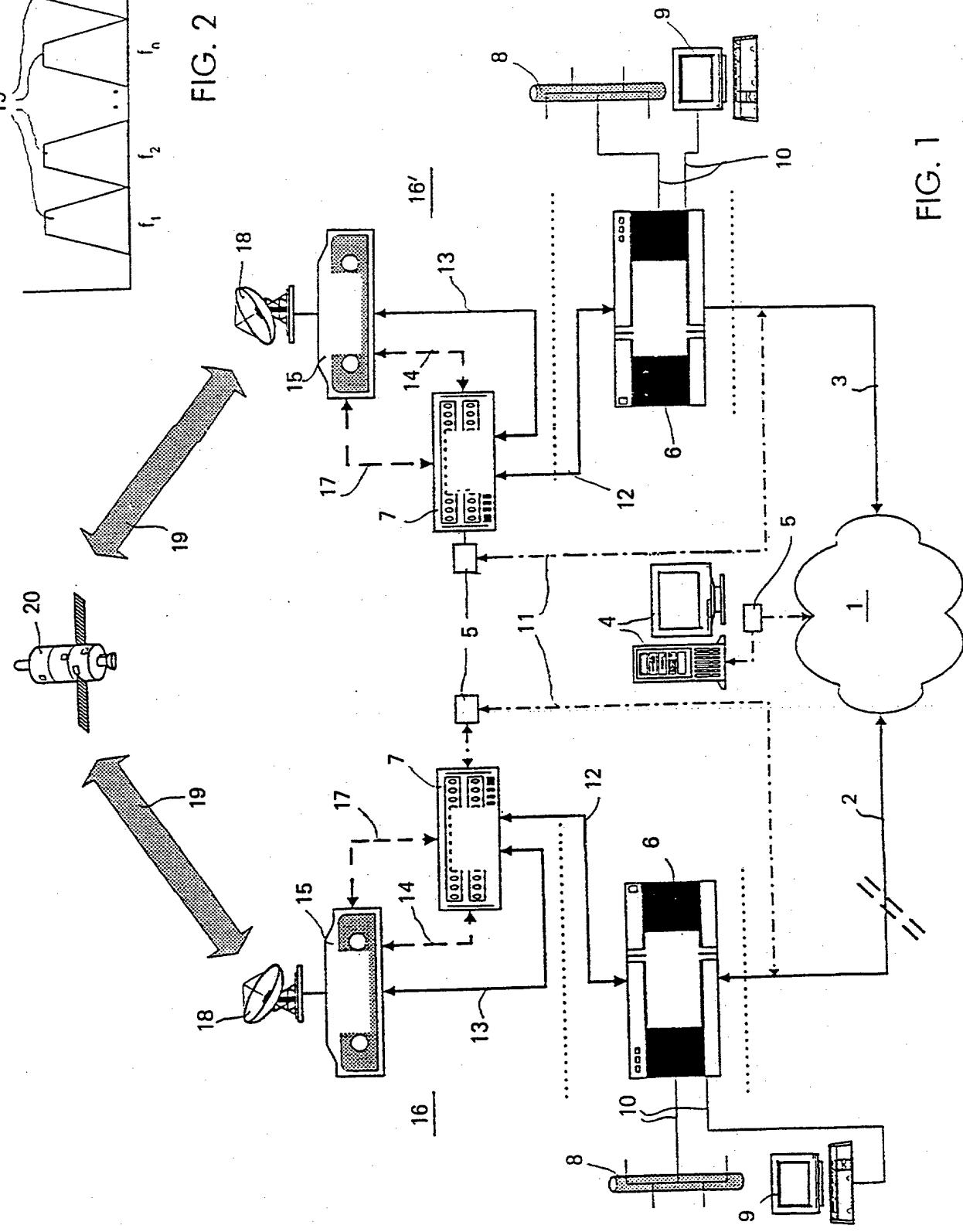


FIG. 2



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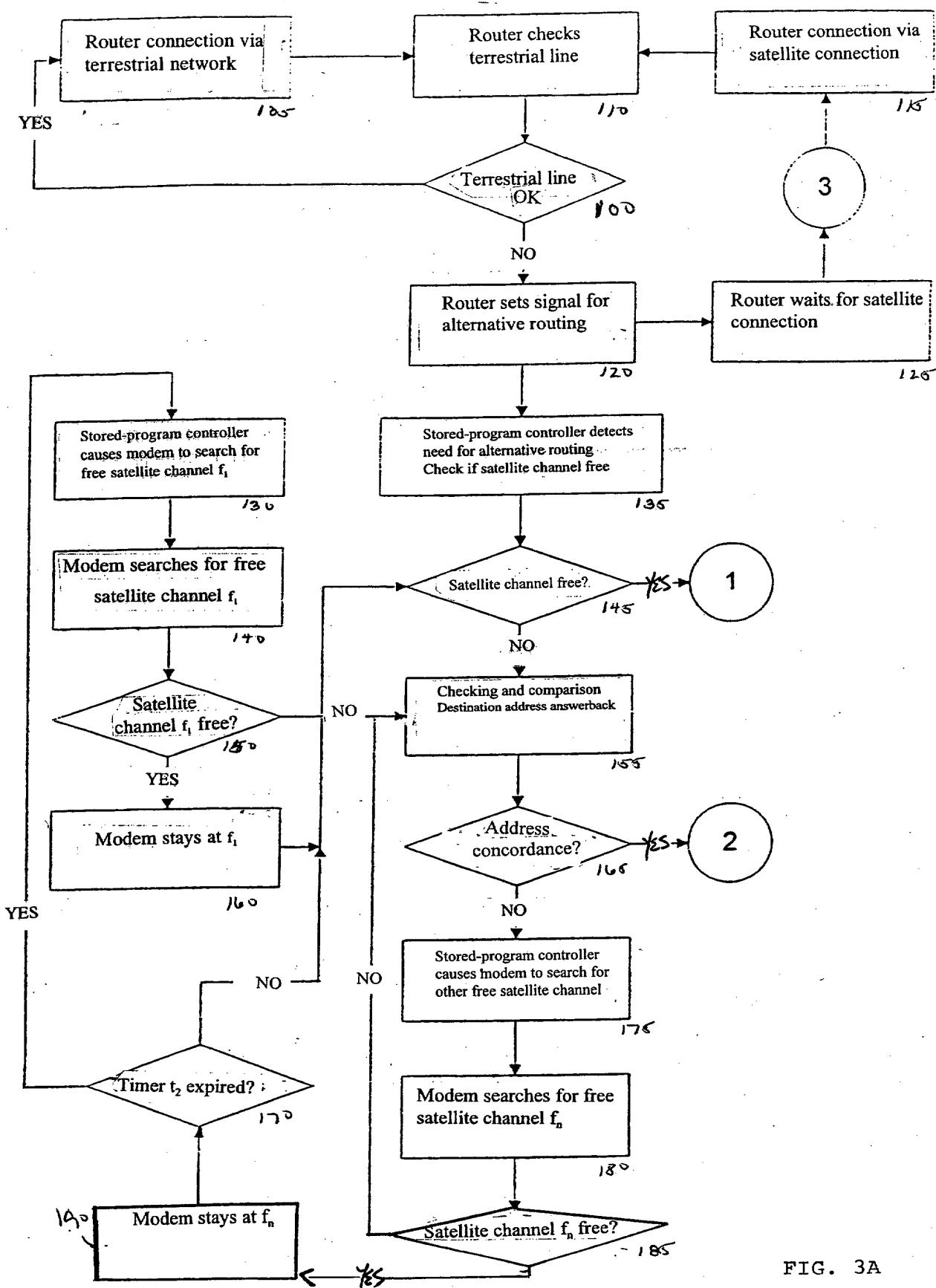


FIG. 3A

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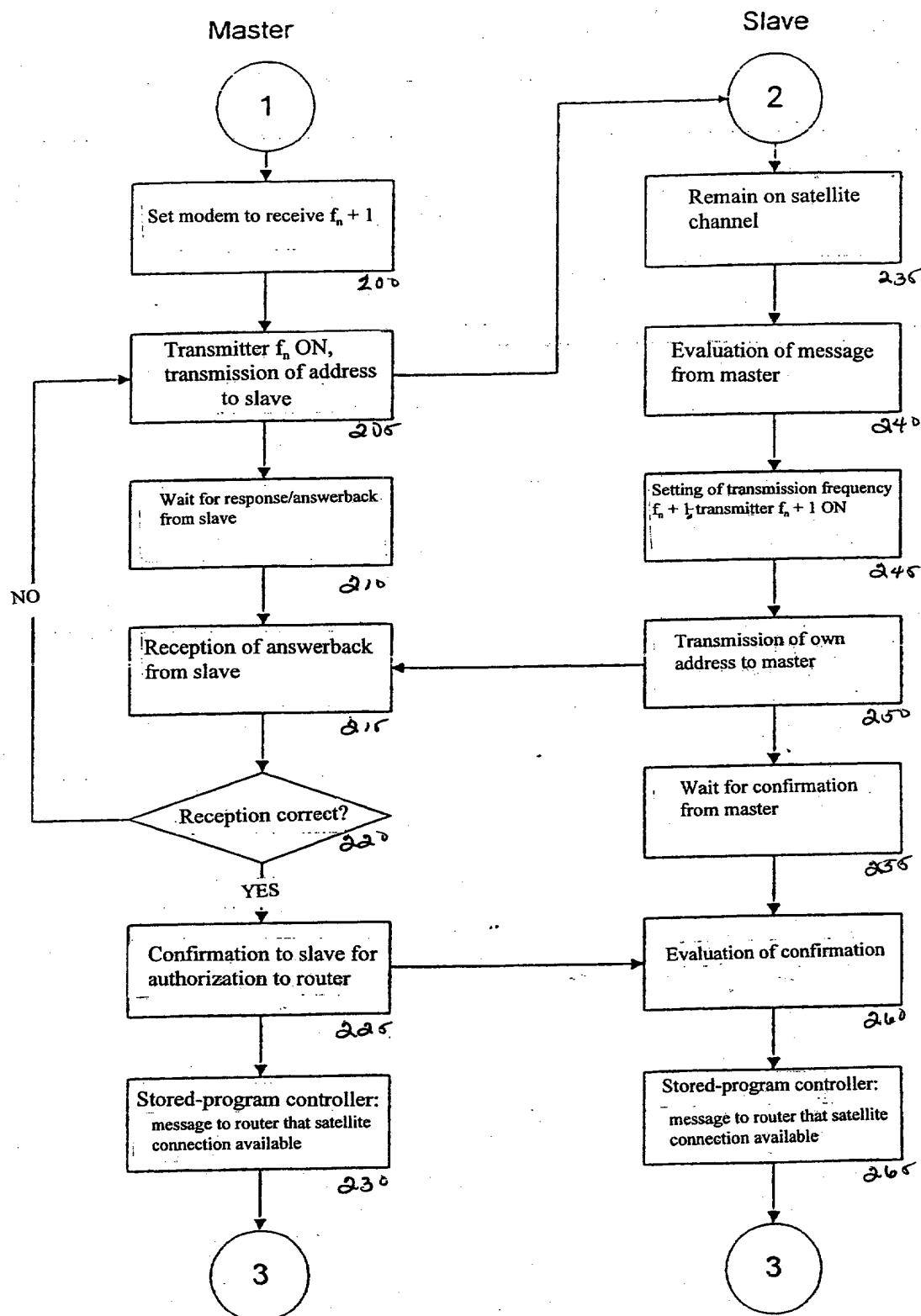


FIG 3R

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

DECLARATION AND POWER OF ATTORNEY

ATTORNEY'S DOCKET
NO.
2345/112

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name,

I believe I am an original, first, and joint inventor of the subject matter that is claimed and for which a patent is sought on the invention entitled **METHOD AND SYSTEM FOR CONTROLLING THE USE OF SATELLITE TRANSMISSION CAPACITY IN TERRESTRIAL NETWORKS**, the specification of which was filed as International Application No. PCT/EP98/03747 on 19 June 1998 and is filed herewith in the United States Patent and Trademark Office.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

PRIOR FOREIGN APPLICATION(S)

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. § 119
GERMANY	197 28 061.7	1 July 1997		YES

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys:

Richard L. Mayer (Reg. No. 22,490)

Erik R. Swanson (Reg. No. 40,833)

EL234411411US

I declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful statements may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR	FAMILY NAME HENKEL	FIRST GIVEN NAME Hans-Juergen	SECOND GIVEN NAME
RESIDENCE & CITIZENSHIP	CITY & ZIPCODE D-64380 Roseldorf	STATE OR FOREIGN COUNTRY Germany	COUNTRY OF CITIZENSHIP Germany
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Signature	d Henkel		Date December 14th, 1999